Tied Transfers

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Since Becker (1974) a great deal has been written about financial transfers from parents to children. The reasons for this are clear. Parental investments are a central input into children's human capital and well being. Parental transfers have the potential to undo or reinforce the public safety net, and hence may influence the behavioral effects of public transfers. And financial transfers may influence the evolution of inequality in the Uniter States either directly or through their effect on educational attainment.[1]

A much smaller literature examines *inter vivos* transfers that are tied to expenses associated with higher education.[2] The existence of tied transfers raises a puzzle, since we generally think individuals prefer cash to in-kind transfers of the same market value, because in-kind transfers constrain the choice set whereas cash transfers do not.[3] Moreover, a substantial portion of total *inter vivos* transfers are tied to higher education, so writing down and testing models of tied transfers is an essential building block to fully understanding the financial relationships between parents and children.

Tied transfers may occur as a result of cooperative or noncooperative relationships between parents and adult children. We examine this consideration in Section 1, where we describe the results of a simple empirical test that rejects the cooperative model. Given this result, children and parents behave noncooperatively in our analytic model.

Our model builds on the work of Altig and Davis (1992) and Bruce and Waldman (1990). Like Altig and Davis, we emphasize market imperfections as one of the key factors determining

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[1] The New York Times, for example, notes that "At prestigious universities around the country, from flagship state colleges to the Ivy League, more and more students from upper-income families are edging out those from the middle class, according to university data" ("As Wealthy Fill Top Colleges, New Efforts to Level the Field," David Leonhardt, April 22, 2004).

[2] We use the term "tied transfers" to refer to in-kind transfers tied to specific purposes.

the timing and magnitude of transfers. Like Bruce and Waldman, our model shows why a large portion of parent-child transfers are tied and in doing so, offers a theory about the timing of transfers.[4] We extend previous work by allowing a human capital investment decision and uncertainty in children's earnings, the latter feature being essential for obtaining our empirical predictions.[5]

Our model makes two empirical predictions that we examine. First, tied educational transfers from the parent to the child as a fraction of the total educational expenditures for the child, increase with the level of parental wealth and altruism. The intuition is that wealthier and more altruistic parents have a greater economic incentive to curtail strategic behavior on the part of their children and do so by tying a larger share of total transfers. This effectively minimizes the child's ability to engage in strategic behavior. Second, if tying transfers is an effective strategy that some parents can use to mitigate strategic behavior, tied transfers and subsequent cash transfers ought to be negatively correlated. Put differently, tied transfers must "buy" something – what they buy (in some circumstances) is smaller subsequent cash transfers.

We examine these empirical propositions using data from the Health and Retirement Study (HRS) and the Wisconsin Longitudinal Survey (WLS). Few datasets distinguish cash and tied transfers and have the necessary information to examine the empirical predictions. The HRS has the information to address the first test, the WLS has the information to examine the second. The data are consistent with both implications, suggesting that the model, where children behave

[3] A similar puzzle arises from the government's use of in-kind rather than cash transfers. See Coate (1995) and Brown (2004) for discussions of these issues in the context of government income transfer programs.
[4] The standard economic environment where altruistic parents make transfers in order to equate marginal utilities across generations makes no predictions about the timing and the magnitude of intergenerational transfers.
[5] Further, the equilibrium outcome within the family may not necessarily be Pareto efficient. This raises the possibility that market interventions could improve the wellbeing of some types of families.

noncooperatively in the presence of capital market imperfections, provides a useful framework for examining household transfer patterns. Our results also provide new information on factors affecting the timing and composition of financial transfers between parents and children.

I. Income Pooling Tests

Our empirical test of efficiency (or cooperative behavior within the household) is similar to models estimated in Altonji, Hayashi, and Kotlikoff (1992), who test risk sharing within and between families using data from the Panel Study of Income Dynamics (PSID).[6] Specifically, they examine whether consumption is affected by individual resources (or income), controlling for total resources (or income) within the extended family.

We also use PSID data for our test of efficiency and follow the same intuition examined by Altonji, Hayashi, and Kotlikoff (1992). We use the 1993 wave of the PSID for three reasons. First, the PSID is the only data set with detailed information on parent and child incomes and family consumption. Second, the 1993 wave is the most recent survey year that reported food costs on an annual basis. Third, 1993 is a year that matches the years covered in the primary datasets used in the rest of our paper (the 1992/93 WLS and 1994-2000 HRS).

The dependent variable for the empirical model is the annual food expenditure of the child's family. To get the total annual consumption of food, we add up the three food expenditure variables available in the 1993 PSID: (1) annual food expenditure for food used at home; (2)

[6] The PSID began in 1968. It is a longitudinal study of a representative sample of U.S. individuals (men, women, and children) and the family units in which they reside. The PSID is a natural data set to use for a test of efficiency because it provides information on the annual income and food consumption of both parents' and children's own families. The data on adult children are from the split-off families who have moved out of the original PSID households since 1968. By the 1993 wave of the PSID, we can identify 4,510 original families (some without children) and 5,467 split-off families, and merge them to get the data of parent-children household pairs. After dropping missing observations from the covariates of our empirical models, we have 3,427 parent-child pairs generated by 1,380 original families.

annual food expenditure for meals away from home; and (3) value of food stamps in 1992.[7] The central independent variables are total income (parent plus child income) and total income squared, and parent's household income and its square. With full efficiency, only the total income of the parent-child pair should influence the child's family's food consumption: the specific location of the income (with the parent or with the child) should not influence consumption once we condition on other characteristics (including total income of the parent-child pair).[8]

We also condition on parent's age (measured as the age of the household head in 1993), an indicator of female head, parental working status, parental net worth, parental educational attainment (dummied out by categories of educational achievement), marital status of the parents, number of persons in the parent's family unit, and number of children who moved out of the parent's family. We include the child's age, an indicator of female head of the child's family, child's working status, child's net worth, child education (again using indicator variables), number of persons in the child's family unit, and child's marital status.

The PSID does not generally have information on the parents of married spouses of original sample members. Therefore, to avoid potential bias that might arise from transfers made by in-laws, we restrict the primary sample to unmarried children. To control for correlations between siblings who moved out of the same families, we estimate the model with clustered error terms

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[7] The qualitative results do not change when we use just (1), or (1) plus (2) as the dependent variable.

[8] We look directly at the effect of parental income on the consumption of children, controlling for combined income of the parent-child pair, using a sample of unmarried adult children. In contrast, Altonji, Hayashi, and Kotlikoff (1992) use the fact that under the collective model, the parents and children have the same marginal utility of income, which is captured by a fixed-effect in their food demand regressions. Under the altruism model, exogenous income (or assets) should not be significant in the food demand equations when a fixed effect is included (using repeated observations on consumption).

and thus present robust standard errors. Estimates are given in Table 1 and descriptive statistics are given in Appendix Table 1.[9]

The food consumption of the child's family is an increasing function of the sum of parental and child income. Food consumption of the child's family is a decreasing function of parental income. Inflection points for the quadratic functions for total and parental income both exceed $220,000. Evaluated at the means of the data, the food consumption elasticity with respect to total income is 0.404. The child's food consumption elasticity with respect to parental income is –0.152. We therefore reject full efficiency. The other coefficient estimates are generally consistent with other empirical models of consumption, but few coefficient estimates are significant at usual levels of confidence. Not surprisingly, the child's family food consumption is strongly, positively correlated with the number of people in the family unit. And female children spend less on food.

These results rejecting full efficiency are consistent with the results of Altonji, Hayashi, and Kotlikoff (1992). They also influence our decision to model transfer decisions are being the result of non-cooperative interactions between parents and children.[10]

II. A model of tied transfers

Our model builds on Bruce and Waldman (1991), who write down a model of repeated parent-child transfer opportunities. Under fairly general conditions, they show that even a non-paternalistic parent, if sufficiently wealthy and altruistic, will value the ability to tie transfers to

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[9] The qualitative results are also similar when we estimate the empirical models with the full sample of parents and children. All results not shown in tables are available from the authors on request.
[10] Non-cooperative models are also common in the literature on *inter-vivos* transfers. See, for example, Becker (1974), Bruce and Waldman (1990, 1991), Lindbeck and Weibull (1988) and Altonji, Hayashi and Kotlikoff (1997).

investments. The reason is that gifts of investments lower children's reliance on their parents. Our model shares this intuition.

Our framework allows for a human capital investment decision and uncertainty in children's earnings. Having an explicit human capital investment decision allows us to disentangle the human capital production function from parents' preferences, which helps us generate empirical predictions that can be examined with data.[11] Children may invest in their own human capital. Parents may make tied educational transfers, or cash transfers when children are acquiring human capital, or cash transfers later on when children are out of school. Parents' behavior is affected by their endowment, children's ability and by the degree of altruism toward the child. And children may end up with inefficient human capital investment, even when the parent has access to the tied transfer mechanism. We show that uncertainty in children's earnings plays a crucial role in determining the timing of transfers

We start our discussion with an analytic model, where there is no uncertainty over the child's earnings, that provides the essential intuition. We then incorporate uncertainty in child earnings and develop our key empirical predictions using numerical methods.[12]

a. The Economic Environment

Consider a two period model where parents are altruistic about the welfare of their children, caring about their children's utility. In the first period, parents decide how much in cash and

[11] Pollak (1988) presents a model of tied transfers and focuses on paternalistic preferences. Specifically, the parent's utility depends on the goods consumed by the child, rather than simply depending on the child's welfare. Our approach ensures that any distinction between the roles of tied and cash transfers does not arise from preferences. Preferences undoubtedly play some role in understanding tied transfers, but we focus on other aspects of the problem that yield falsifiable implications.

[12] Our work is similar to Perozek (1996) in that she writes down a model of non-cooperative behavior between parents and children and derives empirical predictions from the model. We assume that parental expenditures and children's expenditures on education are perfect substitutes while Perozek assumes that they are complementary

educational transfers to pass on to their children and in the second period, decide how much in cash transfers to give to them. Given our rejection of full efficiency, we assume that parents and children behave in a non-cooperative fashion. In particular, the parent moves first and decides how much in tied and cash transfers to give the child. The child sees these transfers and then decides how much to consume and save. In the second period, the parent first decides how much in cash to give the child and the child then decides how much to consume. We also assume that the child cannot borrow against his or her future income.[13]

Consider a parent and child choosing investment in physical capital, *a*, and investment in the child's postsecondary education, *e*. Assume that the rate of return on physical capital is constant at *R* and the return to total human capital investment *e* is *h(e)* such that $h'(\cdot) > 0,\ h''(\cdot) < 0$ and $h'(0) > R.$

The parent, *p*, and child, *k*, have utilities of consumption in the two periods given by

$$U^k(c_1^k, c_2^k) = u(c_1^k) + \beta u(c_2^k) \text{ and}$$
$$U^p(c_1^p, c_2^p, c_1^k, c_2^k) = u(c_1^p) + \beta u(c_2^p) + \alpha\left(u(c_1^k) + \beta u(c_2^k)\right),$$

where c_t^j represents the period *t* consumption of agent *j*, α expresses the parent's degree of purely altruistic concern for the child's welfare, and β is the rate at which each agent discounts future utility. Single period utility of consumption for each agent, $u(\cdot)$, is such that $u'(\cdot) > 0,\ u''(\cdot) < 0$ and $u'(0) = +\infty.$

inputs. The empirical focus of the two papers is also somewhat different, as Perozek examines differences in educational investments across families with different numbers of children.

[13] While our two assumptions – non-cooperative behavior, and children cannot borrow against future income – are realistic, both assumptions are necessary to obtain empirical predictions on the timing and magnitude of transfers.

The parent acts as a Stackleberg leader, moving first in period 1, choosing c_1^p, a^p, e^p and first period transfer to the child g_1, subject to constraints $c_1^p + a^p + e^p + g_1 \le x^p$, $g_1 \ge 0$ and $e^p \ge 0$. As a result of the one-sided altruism and non-cooperative interaction between the parent and the child, the parent is unable to draw resources from the child either through a negative transfer or through negative investment in the child's education. The non-negativity of cash transfers in the second period will play a crucial role in determining equilibrium investments.

The child takes the parent's choices of c_1^p, a^p and e^p as given, choosing c_1^k, a^k and e^k subject to constraints $c_1^k + a^k + e^k \le g_1$, $e^k \ge 0$ and $a^k \ge 0$. In the second period, the parent determines consumption c_2^p and the amount of the second period cash transfer to the child, g_2, subject to constraints $c_2^p + g_1 \le Ra^p$ and $g_2 \ge 0$. The child consumes his total resources, so that $c_2^k = Ra^k + h(e^p + e^k) + g_2$.

b. Period 2

The parent's problem in the second period is

$$\max_{g_2 \ge 0} \left\{ u(Ra^p - g_2) + \alpha u(Ra^k + h(e^p + e^k) + g_2) \right\},$$

and the optimal transfer, given the second period resources of the parent and child, is

$$g_2(Ra^p, Ra^k + h(e^p + e^k)) = \begin{cases} g_2 \text{ such that } u'(Ra^p - g_2) = \alpha u'(Ra^k + h(e^p + e^k) + g_2) \\ \qquad \text{where } u'(Ra^p) < \alpha u'(Ra^k + h(e^p + e^k)), \\ 0 \quad \text{otherwise.} \end{cases} \tag{1}$$

When the transfer that equates second period marginal utilities across generations is positive, the parent achieves his or her preferred allocation of the family's total final-stage resources. The important feature of this second period transfer is that it is compensatory. The parent's altruism toward the child implies that the final transfer decreases with the child's assets and earnings.

c. Period 1: Child

In the first period, the child determines his or her own consumption, saving, and educational investment given the $(g_1,\ a^p,\ e^p)$ chosen by the parent. The child's problem is

$$\max_{c_1^k, c_2^k, e^k \geq 0, a^k \geq 0} \left\{ u(c_1^k) + \beta u(c_2^k) \right\}$$
$$s.t.\ \ c_1^k + e^k + a^k \leq g_1,$$
$$c_2^k = Ra^k + h(e^p + e^k) + g_2(Ra^p, Ra^k + h(e^p + e^k)) \text{ and}$$
$$g_2(Ra^p, Ra^k + h(e^p + e^k)) \text{ as in (1).}$$

The function $g_2(Ra^p,\ Ra^k + h(e^p + e^k))$ is continuous but non-differentiable where $\alpha u'(Ra^k + h(e^p + e^k)) = u'(Ra^p)$. This non-differentiability creates two segments of the family's problem, representing the regions in which second period transfers do and do not take place.

We learn two useful things from the child's first order conditions. First, the child will over-consume in the first period in order to achieve consumption path $\{c_1^k, c_2^k\}$ such that

$$u'(c_1^k) = \beta \max\left\{R, h'(e^p + e^k)\right\}\left(1 + \frac{\partial g_2}{\partial(Ra^k + h(e^p + e^k))}\right)u'(c_2^k) \qquad (2)$$

whenever $g_2 > 0,$ since $\frac{\partial g_2}{\partial(Ra^k + h(e^p + e^k))} < 0$, and the child can choose e^k and a^k to meet (2) and still satisfy $a^k \geq 0$ and $e^k \geq 0.$ Second, $a^k \geq 0$ and $e^k \geq 0$ both bind for the child if the parent chooses $e^p,\ a^p$ and g_1 such that

$$u'(g_1) \geq \beta \max\left\{R, h'(e^p)\right\}\left(1 + \frac{\partial g_2}{\partial(h(e^p))}\right)u'(h(e^p) + g_2(Ra^p, h(e^p))). \qquad (3)$$

Recalling expression (1), we see that if e^p, a^p and g_1 satisfy both

$$\alpha u'(h(e^p)) \geq u'(Ra^p) \tag{4}$$

and (3), then $g_2(Ra^p, Ra^k + h(e^p + e^k)) \geq 0$ does not bind in period 2 and both $e^k \geq 0$ and $a^k \geq 0$ bind at the child's optimum. If e^p, a^p and g_1 satisfy (3) but not (4), then both $e^k \geq 0$ and $a^k \geq 0$ still bind at the child's optimum, but $g_2(Ra^p, Ra^k + h(e^p + e^k)) \geq 0$ binds in period 2. This set of conditions will be useful in solving the parent's problem.

d. Period 1: Parent

In period 1, the parent chooses c_1^p, g_1, e^p and a^p to maximize his or her utility, subject to $c_1^p + a^p + e^p + g_1 \leq x^p$, $g_1 \geq 0$ and $e^p \geq 0$.[14]

Proposition 1*:* There exists a unique set of equilibrium consumption levels $\{c_1^p, c_2^p, c_1^k, c_2^k\}$. *(i)* If $g_2 > 0$ in any equilibrium, then $\frac{e^p}{e^p + e^k} = 1$ and the equilibrium is unique. *(ii)* If $g_2 = 0$ in any equilibrium, then $\frac{e^p}{e^p + e^k} \in [0,1]$ and the equilibrium need not be unique.

Proof: See Appendix A.

The first type of equilibrium is one in which $g_2 > 0$ and $\frac{e^p}{e^p + e^k} = 1$. In this case, parents' second period transfer liabilities generate strategic concerns, and therefore the parent bears all responsibility for the investment in the child's education. The child realizes that the parent will be in the interior of the transfer region in the second period and hence over-consumes in the first period to extract as much as possible from the parent. The parent, in turn, takes this into account and gives as much as possible in tied transfers in the first period. The value of the tied transfer is such that the marginal return to an additional dollar equals the real interest rate.

The second type of equilibrium is one in which $g_2 = 0$ and $\frac{e^p}{e^p + e^k} \in [0,1]$. Here the parent is poor relative to his or her child and consequently intends not to make transfers in the second period. In this equilibrium the parent and child agree on the inter-temporal condition to be met by the child's consumption and the family's net investment in the child's education. In this region, the child does not have an incentive to behave strategically. The fact that the parent and child each prefer for $e^p + e^k$ to meet $u'(g_1 - e^k) = \beta h'(e^p + e^k) u'(h(e^p + e^k))$ implies that if the parent decreased her choice of e^p by $1 and increased her choice of g_1 by $1, then the child would allocate the entire increase in the first period gift to e^k. Thus only $g_1 + e^p$ is determined for families in the second type of equilibrium. What happens here is that since the parent and the child "agree," the parent simply transfers an amount in the first period and is indifferent to what part is tied and what part is cash. Indeed, only the total sum is determinate.

The indeterminacy in the second type of equilibrium can be eliminated by moving from the deterministic model presented above to a more realistic stochastic model where second period child income is uncertain.

[14] Note that the assumptions throughout the problem imply that $g_1 \geq 0$ and $e^p \geq 0$ do not bind at the parent's optimum: $u'(0) = +\infty$ and $\alpha > 0 \Rightarrow g_1 \geq 0$; $u'(0) = +\infty$, $\alpha > 0$ and $h'(0) > R \Rightarrow e^p > 0$.

e. A Stochastic Version of the Model

The analytic model sharply distinguishes families by whether or not they will make cash transfers in period 2. Those that will, interact strategically with their children. Those that will not, do not need to worry about strategy. This sharp separation of families into type, however, is too stark when trying to match model with data. As Proposition 1 above demonstrates, if the parent knows with certainty that he or she will transfer nothing in period 2, then the amount of tied transfers in period 1 is indeterminate. To obtain sharper predictions, we add to the model uncertainty in children's earnings. Families surely do not know the future incomes of their children at the time they make educational investments. If second period child income is uncertain, this expands the fraction of families where strategic concerns come into play. Adding uncertain second period child income is sufficient to generate two strong empirical predictions that we describe below.

Consider a shock to the child's earnings, θ which is realized in period 2 and drawn from a distribution $\Theta(\theta)$. We assume that the shock is i.i.d.

In period 1 the child solves

$$V_k(g_1, e^p, a^p) = \max_{c_1^k, e^k \geq 0, a^k \geq 0} \left\{ u(c_1^k) + \beta \int u(c_2^k) d\Theta(\theta) \right\}$$

$$s.t.\ \ c_1^k + e^k + a^k \leq g_1,$$

$$c_2^k = Ra^k + \theta h(e^p + e^k) + g_2(Ra^p, Ra^k + \theta h(e^p + e^k)).$$

Notice the dependence of g_2 on θ. This makes the second period gift uncertain and plays a crucial role in determining optimal first period transfers. The parent in the first period solves

$$\max_{c_1^p, e^p \geq 0, a^p \geq 0} \left\{ u(c_1^p) + \beta u(c_2^p) + \alpha V_k(g_1, e^p, a^p) \right\}$$

$$s.t. \;\; c_1^p + e^p + a^p + g_1 \leq x^p,$$

$$c_2^p = Ra^p - g_2(Ra^p, Ra^k + \theta h(e^p + e^k)).$$

For simplicity, we assume there is no uncertainty in the parent's income. Note that the term a^p appears as a state variable in the child's problem. The child keeps track of the parent's second period wealth to ascertain how much he or she will receive from his parent. If the parent is in the $g_2 > 0$ region, then a higher a^p will induce a higher transfer and hence lead to strategic behavior. However, the presence of uncertainty in the model (and the fact that these earnings shocks are uninsurable) exacerbates strategic considerations. The parent understands that some state of the world could be realized in period 2 that would require some transfer to the child. The child recognizes this and is therefore more willing to over-consume. This creates an incentive for the parent to tie part of the period 1 transfer, removing the indeterminacy of the analytic version of the model.

We solve the model numerically and our testable implications do not depend on the specific parameter values that we pick. We assume that the utility function is of the CRRA variety and the shock to earnings is log-normally distributed. Specifically, $U(c)=\frac{c^{1-\gamma}}{1-\gamma}$, $h(e)=e^{\phi}$ and

$\theta \sim \log N(\mu_{\theta},\sigma^{2}{}_{\theta})$. Our predictions hold for $\gamma \in [1,5]$ and $\phi \in [0.4, 0.99]$.[15]

f. Testable Implications

The stochastic version of the model makes two key predictions that we take to the data. First, the model implies that wealthier (higher x^{p}) or more altruistic parents (higher α) will invest more in their children's education as a fraction of total educational expenditures. Children of wealthier or more altruistic parents realize that they have more to gain by trying to manipulate their parents, relative to children of parents who are less wealthy or less altruistic. The wealthier or more altruistic parents respond by spending more on their children's education.

Specifically, our model predicts that $\frac{e^{p}}{e^{p}+e^{k}}$ is increasing in parental wealth and in parental altruism. Furthermore, concavity of the human capital production function also guarantees that this relationship is concave.

Recall that we consider three sources of heterogeneity: parental wealth (and income), parental altruism, and the ability of children. Tied and subsequent cash transfers (e^{p} and g_{2}) will be positively correlated if parental resources are the only underlying source of variation in the data. Similarly, tied and cash transfers will be positively correlated if parental altruism is the only source of variation in the data. Thus, in empirical work it is necessary to condition on parental wealth, income, and altruism when examining the correlation between tied and cash transfers. If we focus our attention on the sample of parents for whom g_{2} is positive, parents

[15] Our numerical analysis has examined these specific ranges of parameters – we are sure that the two central

who end up in equilibrium giving more in e^p (and they will end up giving more in e^p, the higher their children's ability) will, on average, compensate for it by reducing their subsequent cash transfers. Thus, our second empirical prediction is that, conditional on parental resources and the degree of altruism, tied transfers, e^p, and subsequent cash transfers, g_2, are negatively correlated. Since there are shocks to children's earnings realized in period 2, there will be parents who make second period transfers, simply because their children have received a bad draw and not because they want to compensate them for lower first period transfers. Consequently, our numerical results also suggest that this degree of correlation between tied transfers and subsequent cash transfers must be less than 1.

III. Tests of the model propositions[16]

Only a handful of datasets in the United States have information on both cash and tied transfers for representative samples of the population. To examine the empirical propositions, we focus on two data sets: the Health and Retirement Study (HRS) and the Wisconsin Longitudinal Study (WLS). Only the HRS has information needed to examine how the fraction of total educational expenditures paid for by the parent varies with the income, wealth and altruism of the parent.[17] The WLS is best suited for examining the second empirical proposition, since it includes information on specific dollar amounts of cash and tied transfers for multiple-child families, which allows us to estimate models with fixed effects that account for unobserved

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empirical predictions holds for a broader range of parameters than these.

[16] Descriptive statistics for the datasets used in the paper are given in Appendix Tables 1 (PSID), 2 (HRS), and 3 (WLS).

[17] The WLS, for example, does not have information on the child's contribution to higher educational expenses. Consequently, it cannot be used to examine the first empirical proposition.

parental altruism.[18] We describe the datasets and empirical estimates below.

a. The Health and Retirement Study (HRS)

The HRS is a national panel study with an initial sample (in 1992) of 12,652 persons and 7,607 households.[19] It oversamples blacks, Hispanics, and residents of Florida. The baseline 1992 study consisted of in-home, face-to-face interviews with the 1931-1941 birth cohort and their spouses, if married. Follow-up interviews were given by telephone in 1994, 1996, 1998, 2000, and 2002.

Over the first three waves, the questions on financial and tied transfers varied. In Wave 1 (1992) the question asked about transfers exceeding $500 in the last 12 months, in Wave 2 (1994) it asked about transfers exceeding $100 in the last 12 months, and in waves 3 through 6 the questions asked about transfers exceeding $500 in the last 24 months. The specific question in 2000 (Wave 5), for example, reads:

> "Including help with education but not shared housing or shared food (or any deed to a house), in the last 2 years did [the Respondent or Spouse] give financial help totaling $500 or more to any of their children or grandchildren?"

Those answering "yes" were then asked how much. The 2000 wave of the HRS also asked specifically about educational transfers for each child, but the amounts were not elicited. Rather, parents were asked if they paid "none, some, or most or all" of the costs associated with education beyond high school.

Additional information on tied transfers comes from the 2001 Human Capital Mail Survey

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[18] The HRS does not yet separate information on tied and cash transfers, though the information will eventually be available for a subsample that participated in the Human Capital Mail Survey. Consequently, we cannot use the HRS to examine the second empirical proposition.

[19]The survey covers a wide range of topics, including batteries of questions on health and cognitive conditions and status; retirement plans and perspectives; attitudes, preferences, expectations, and subjective probabilities; family structure and transfers; employment status and job history; job demands and requirements; disability; demographic background; housing; income and net worth; and health insurance and pension plans.

(HUMS) of the HRS. A subset of HRS respondents received and returned the HUMS, which included a question on the percent of each child's college tuition paid by the parent. The benefit of this measure is that it provides continuous information on the parent's share of investment; its drawback is that we observe the percent of tuition in the HUMS for only 2,166 of the 7,139 general survey children who have attended college by 2000.

The HRS also contains an unusual proxy measure for the parent's degree of altruism. Modules in the 1996 and 2000 HRS ask respondents about the conditions under which they would be willing to give to a variety of individuals and organizations. The survey question that we employ as a measure of each parent's economic altruism toward her children is the following:

> Suppose that [your child/one of your children] had only [one half/three-quarters/one third] as much income to live on per person as you do. Would you be willing to give your child 5% of your own family income per month, to help out until things changed – which might be several years?

Since roughly ninety percent of parents replied that they would transfer to a child with one-third or one-half of their income, we focus on responses for the hypothetical case in which the child has three-quarters of the parent's income. Sixty-two percent of parents in our sample responded positively to this version of the question in either 1996 or 2000.

b. Wealthier and more altruistic parents finance greater shares of their children's education.

Our empirical model examines the share of educational expenses paid for by the parent conditioning on family demographic characteristics and parents' assets and reported degree of economic altruism

$$\frac{e^p}{e^p + e^k} = X\beta + \phi \cdot \chi(\alpha_{3/4}) + W\delta + \varepsilon, \qquad (5)$$

where W is a vector of measures of the parents' affluence, including the parent's household income, income squared, and net worth. The measure of $\frac{e^p}{e^p + e^k}$ used in ordered logistic specification shown in Table 2 is the HRS 2000 wave information on whether the parent paid for none, some, or all of the child's post-secondary education expenses. The measure of $\frac{e^p}{e^p + e^k}$ used in Table 3 is the percent of the child's tuition paid by the parent as reported in the HUMS subsample. The covariates included in X are parent's age, number of children, and indicator variables for the parent's educational attainment, race and ethnicity. We also include in X the child's age, gender, and whether he or she is a stepchild.

The key coefficients of interest in Table 2 are the δ vector of coefficients on the parent's income, income squared, and net worth and the ϕ coefficient on the indicator for the parent's willingness to make an altruistic transfer to the child. The tied transfers model implies that the elements in δ should reflect an increasing share of educational investment from the parent as the parent's income and wealth increases, and that ϕ should reflect a positive effect of the parent's degree of economic altruism on the parent's share of educational investment.

The Table 2 estimates indicate a significantly positive conditional correlation of parents' educational investment shares and their income and net worth. The effect of a marginal dollar of income on the outcome of interest, here the probability of a greater transfer share, is positive (at a decreasing rate) for all incomes below \$1.67 million, which includes all but the highest incomes observed in the sample. The estimated coefficient on net worth implies that, at sample mean characteristics, an increase of \$100,000 in household net worth is associated with a 1.09 percentage point increase in the probability that the parent pays for all of the child's schooling, and a 0.94 percentage point decrease in the probability that the parent pays for none of the child's schooling.

The correlation between the measure of parental altruism and parents' investment shares, evaluated when $\chi(\alpha_{3/4})=1$ and where $\chi(\alpha_{3/4})=0$ and at the sample mean of all other characteristics, is 5.81 percent. Put differently the parent who reports that she would give transfers to a child with ¾ of her income is 5.81 percentage points more likely to pay for all of her child's schooling than a parent who would not give. A similar calculation implies that a parent who would give transfers to a child with ¾ of her income is 7.43 percentage points *less* likely to not pay for any of her child's schooling.

Table 3 presents similar regressions to those presented in Table 2, but using as the dependent variable the HRS HUMS question about the percentage of the child's educational expenses paid for by parents.[20] As in Table 2, the coefficients on income and net worth in Table 3 are significantly, positively correlated with the percent of the child's tuition paid by the parent. The effect of the marginal dollar of income on the percent of covered tuition increases at a decreasing rate, and, at the reported point estimates for the coefficients on income and income squared, it is positive for almost the entire range of incomes in the sample. The indicator variable for whether the parent would transfer to a child with ¾ of her income is associated with a 6.49 percentage point increase in the share of tuition paid by the parent. Together, Tables 2 and 3 provide evidence of a generally large, significant positive association between parental assets and the shares of investment in children's human capital, and between parental altruism and shares of human capital investment.

[20] Given the continuous dependent variable, we estimate OLS models. Results are similar if we estimate two-limit Tobit models.

c. The Wisconsin Longitudinal Survey

Given a specific parental endowment, degree of parental altruism, and human capital production function, the stochastic version of the model predicts a unique level of human capital investment (the same is true in the model without uncertainty when $g_2 > 0$). Further, the model predicts that the parent achieves greater transfer savings by investing up to $e^p = h'^{-1}(R)$ where the child is more able, which is to say the efficient level of investment is higher. Thus, in a collection of parent-child pairs with fixed x^p and α but varying child ability, and in which positive post-education transfers occur, we should observe a negative association between cash and tied transfers. In equilibrium, it should be the case that tied transfers buy increased independence for the child, and therefore transfer savings to the parent.

To test this implication we need data on the dollar amounts of tied transfers and subsequent cash transfers. Although the 2000 HRS and HUMS provide information on parental share of educational investments, they do not yet report the exact dollar amounts of educational transfers. Therefore, we test the second empirical proposition using the intergenerational transfer data in the WLS, which contain the dollar amount of educational transfers.[21] We do not have good measures of child ability in the WLS (or in the HRS, for that matter). Our strategy, therefore, is to compare the interactions between a single WLS parent and two or more of her children. Doing so, we are comparing parent-child pairs in which the parent's per-child economic resources are identical. We argue that in this instance we are also comparing parent-child pairs in which the degree of parental altruism is similar. If educational investments made by the parent serve the purpose implied by the strategic model of tied transfers, then we should see

[21] The WLS, however, does not report total educational expenses or information that can be used in calculating

significant savings in post-education cash transfers associated with a dollar of tied transfers in within-family estimates of the dependence of cash on tied transfers.

The WLS is a long-term study of a random sample of 10,317 men and women who graduated from Wisconsin high schools in 1957 and of their randomly selected brothers and sisters.[22] Data were collected from the original respondents or their parents in 1957, 1964, 1975, and 1992. The WLS has enjoyed remarkably high rates of response and sample retention; for example, in the 1992 wave 87 percent of the 9,741 surviving members of the original sample were interviewed. In the 1993 wave, the sample was expanded to include a randomly selected sibling of every respondent.[23]

In the 1992 and 1993 WLS surveys, respondents and selected siblings were asked to report monetary transfers made to their parents and children since 1975 and the reason for the transfer. Possible reasons included: down payment for a home, to increase wealth or reduce debt, payments for housing or other living expenses, educational expenses, or to spend any way the recipient wanted. Sixty-three percent of respondents and 56 percent of siblings reported making at least one transfer to their children.

d. Among parents facing strategic concerns, tied transfers reduce the magnitude of subsequent cash transfers.

Families are included in the estimation sample based on the availability of all relevant transfer and demographic information for at least two children, along with the requirement that

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shares of educational investment; and therefore it is not used to test the first implication.

[22]The WLS data provide a full record of social background, youthful aspirations, schooling, military service, family formation, labor market experiences, and social participation of the original respondents. In 1992 the survey was also extended to obtain detailed occupational histories and job characteristics; incomes, assets, and interhousehold transfers; social and economic characteristics of parents, siblings, and children, and descriptions of the respondents' relationships with them; and extensive information about mental and physical health and well-being.

[23] In 1977, the study design was expanded with the collection of parallel interview data for a highly stratified subsample of 2,429 siblings of the primary respondents.

positive parent-child cash transfers take place. In addition, in an attempt to measure tied transfers for only completed post-secondary schooling, the children sample is confined to those who attended at least some college and were not in schools at the time of interview.[24]

Our empirical specification is a fixed effect model

$$g_2 = X\beta + \lambda e^p + \omega, \tag{6}$$

where g_2 now represents all cash transfers to the child made between 1975 and 1992 following the child's completion of schooling.[25] The fixed effect is for each family: recall, parent-child pairs are the unit of observation. The tied transfer represented in expression (6) is the amount of the transfers made over this period that the parent reports were for educational expenses. The covariates, X, include child age and indicators for whether the child is the oldest, youngest, male, adopted, married, or living with his or her parents.

The fixed effect estimates are shown in Table 4. Tied transfers are significantly, negatively correlated with cash transfers within WLS families. The coefficient on tied transfer indicates a substantial offset of subsequent cash transfers resulting from transfers for education. One dollar of tied transfers saves the parent an average of $.36 in cash transfers between the year in which the child completes school and 1992. Presumably the transfer savings associated with educational expenditures do not terminate in 1992 for this relatively young sample, and so the total return to the tied dollar for the parent will include transfer savings in excess of $.36, as well

[24] Because children's education was not reported for all the WLS sibling respondents – only a small subset of the sibling sample interviewed by mail surveys reported children's education – we restrict the sample to primary WLS respondents and their children.

[25] WLS graduates were generally between the ages of 36 and 53 over this period. Using the survey questions on the years each transfer was made, our g_2 measure excludes cash transfers made in the same year or prior to the year when educational transfers were given. Put differently, g_2 does not include g_1.

as the parent's benefit from the influence of the tied dollar on the child's lifetime earnings.[26] Thus, as implied by the theory, we observe significant savings in post-education cash transfers associated with a dollar of tied transfers, fixing parental resources and altruism.

IV. Conclusions

In this paper we present a theory of the timing and magnitude of cash and tied transfers, with an explicit focus on tied educational transfers. The theory yields two testable implications. Empirical models estimated with data from the HRS and WLS support to these two implications, suggesting that the framework used in the paper, wherein children behave non-cooperatively in the presence of capital market imperfections, provides a useful benchmark with which to analyze household transfer patterns. The magnitude and timing of parental transfers reflects the desire not only to smooth marginal utilities across generations but also to relieve liquidity constraints and limit children's ability to manipulate parents. Indeed, if the parent has sufficient resources, by altering the timing of transfers, efficiency in the allocation of resources within the family can be restored.

Models of parent-child interactions that assume cooperative behavior result in an efficient allocation of resources within the family. A direct consequence is that these models make no predictions about the timing of transfers. As we demonstrate, the addition of uncertainty into the non-cooperative model generates a rich set of predictions that we can take to the data. The theory presented here, which the data support, uniquely determines the timing of transfers. We also present new empirical work on an understudied, but quantitatively important part of the literature

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[26] We can get some sense of the fraction of lifetime cash transfers received by the WLS respondent's children at the time we observe them in our data by "moving back" a generation and looking at the timing of transfer *receipts* of WLS respondents. Sixty-four percent of their transfer receipts occurred after they were 40. Forty is the oldest age of the transfer recipients in our sample.

on inter-family transfers. The share (not just the level) of higher educational expenses paid by parents increases with measures of parental altruism and wealth, and parental investments in higher education appear to reduce subsequent cash transfers.

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Appendix 1: Proofs

Lemma 1: If $g_2 > 0$ in equilibrium, then it must be the case that $a^k > 0$.

The intuition behind lemma 1 is that, since both the parent and the child earn return *R* on physical capital investment, the parent who anticipates a positive second period gift will always prefer to save for the child. A proof of lemma 1 is available form the authors.

Lemma 2: In the first period, the parent can do no better than to choose (g_1, a^p, e^p) to maximize $\left\{u(c_1^p) + \beta u(c_2^p) + \alpha\left(u(g_1) + \beta u(c_2^k)\right)\right\}$ subject to $c_1^p + a^p + e^p + g_1 = x^p$, $c_2^p = Ra^p - g_2(Ra^p, h(e^p))$, $c_2^k = h(e^p) + g_2(Ra^p, h(e^p))$, $g_2(Ra^p, h(e^p))$ as in (1), and $e^k \geq 0$ and $a^k \geq 0$ binding for the child.

Assume an equilibrium consisting of

$$(e^p, a^p, g_1, e^k, a^k, g_2(Ra^p, Ra^k + h(e^p + e^k)))$$

where $e^k + a^k > 0$, and associated consumption levels

$$\{c_1^p, c_2^p, c_1^k, c_2^k\} = \{x^p - g_1 - e^p - a^p, Ra^p - g_2(Ra^p, Ra^k + h(e^p + e^k)),$$
$$g_1 - e^k - a^k, Ra^k + h(e^p + e^k) + g_2(Ra^p, Ra^k + h(e^p + e^k))\}.$$

We find that the parent can replicate the consumption paths of any such equilibrium by deviating from the equilibrium in period 1 to choose first period transfer $\tilde{g}_1 = g_1 - a^k - e^k$, savings $\tilde{a}^p = a^p + a^k$ and human capital investment $\tilde{e}^p = e^p + e^k$. In the deviation, constraints $e^k \geq 0$ and $a^k \geq 0$ bind for the child. The parent can replicate any feasible consumption path by choosing (g_1, a^p, e^p) in the first period such that $e^k \geq 0$ and $a^k \geq 0$ bind, and therefore the parent can do no better than to choose her most preferred period 1 (g_1, a^p, e^p) subject to $e^k \geq 0$ and $a^k \geq 0$ binding for the child. A formal proof of lemma 2 is available from the authors.

Proof of Proposition 1:

Proof Given Lemma 2, consider the parent's solution to

$$\max_{g_1, a^p, e^p} \left\{u(c_1^p) + \beta u(c_2^p) + \alpha\left(u(g_1) + \beta u(c_2^k)\right)\right\}$$

$$\text{s.t.} \quad c_1^p + a^p + e^p + g_1 = x^p,\ c_2^p = Ra^p - g_2(Ra^p, h(e^p)),\ \ c_2^k = h(e^p) + g_2(Ra^p, h(e^p)), \quad (7)$$

$g_2(Ra^p, h(e^p))$ as in (1), and $e^k \geq 0$ and $a^k \geq 0$ binding for the child.

Recall that the requirement that condition (3) holds is equivalent to the requirement that $e^k \geq 0$ and $a^k \geq 0$ bind. Suppose that the parent is permitted to choose g_2 such that $u'(Ra^p - g_2) = \alpha u'(h(e^p) + g_2)$, even if this implies $g_2 < 0$. Without imposing (3), the parent's choice of (g_1, a^p, e^p) meets conditions

$$\begin{aligned} &u'(c_1^p) = \alpha u'(c_1^k),\ u'(c_1^p) = \beta R u'(c_2^p),\ h'(e^p) = R, \text{ and } u'(c_2^p) = \alpha u'(c_2^k), \\ &\text{where } c_1^p = x^p - g_1 - e^p - a^p,\ c_1^k = g_1,\ c_2^p = Ra^p - g_2, \text{ and } c_2^k = h(e^p) + g_2. \end{aligned} \quad (8)$$

Conditions (8) imply $u'(c_1^k) = \beta R u'(c_2^k)$. In transfer expression (1), $\frac{\partial g_2}{\partial(h(e^p))} \leq 0$. Given $h'(e^p) = R$ and $c_1^k = g_1$ in (8), it must be the case that

$$\begin{aligned} &u'(c_1^k) = \beta R u'(c_2^k) \\ &\Rightarrow u'(g_1) \geq \beta \max\{h'(e^p), R\}\left(1 + \frac{\partial g_2}{\partial(h(e^p))}\right)u'(c_2^k) \end{aligned}$$

and therefore (3) is satisfied at the parent's preferred feasible (g_1, a^p, e^p). Conditions (8) are met by a unique set of consumption levels $\{c_1^p, c_2^p, c_1^k, c_2^k\}$. If conditions (8) can be met with $g_2 \geq 0$, then these consumption levels result from the parent's optimal actions given her resource constraints and the choices available to the child.

However, it is possible that conditions (8) cannot be met with $g_2 \geq 0$. Where $g_2 \geq 0$ binds for the parent, the solution to (7) is such that

$$\begin{aligned} &u'(c_1^p) = \alpha u'(c_1^k), u'(c_1^p) = \beta R u'(c_2^p),\ \ h'(e^p) > R,\ u'(c_2^p) > \alpha u'(c_2^k), \text{ and} \\ &u'(c_1^k) = \beta h'(e^p) u'(c_2^k), \text{ where } c_1^p = x^p - g_1 - e^p - a^p,\ c_1^k = g_1,\ c_2^p = Ra^p, \text{ and } c_2^k = h(e^p). \end{aligned} \quad (9)$$

Note that $h'(e^p) > R$, $u'(c_1^k) = \beta h'(e^p) u'(c_2^k)$, $\frac{\partial g_2}{\partial(h(e^p))} \leq 0$, and $c_1^k = g_1$ together imply

$$\begin{aligned} u'(g_1) &= \beta h'(e^p) u'(c_2^k) \\ &\geq \beta \max\{h'(e^p), R\}\left(1 + \frac{\partial g_2}{\partial(h(e^p))}\right)u'(c_2^k), \end{aligned}$$

so that again (3) need not be imposed. Like conditions (8), conditions (9) are satisfied by a unique set of consumption levels $\{c_1^p, c_2^p, c_1^k, c_2^k\}$. In either case, proposition 2 implies that the parent's lifetime welfare at this consumption vector, $u(c_1^p)+\beta u(c_2^p)+\alpha\left(u(c_1^k)+\beta u(c_2^k)\right)$, represents the maximum equilibrium welfare available to the parent given the resource constraints and the child's available choices. The uniqueness of the consumption levels that solve (7) implies that no other set of feasible consumption levels yields higher welfare for the parent, and therefore $\{c_1^p, c_2^p, c_1^k, c_2^k\}$ represents the family's unique equilibrium consumption, completing the proof of *(i)*.

We know, based on (8) and (9), that $\{c_1^p, c_2^p, c_1^k, c_2^k\}$ can be generated by only one set of parental choices $\{g_1, a^p, e^p, g_2\}$ at which $e^k \geq 0$ and $a^k \geq 0$ bind. It may still be the case, however, that this same consumption path can be supported by different transfers and investments where e^k and a^k take positive values. Define $\left\{c_1^p(0), c_2^p(0), c_1^k(0), c_2^k(0),\ g_1(0), a^p(0), e^p(0), g_2(0)\right\}$ as the values of $\left\{c_1^p, c_2^p, c_1^k, c_2^k, g_1, a^p, e^p, g_2\right\}$ in the only equilibrium in which $e^k + a^k = 0$. The parent transfers to the child through $g_1(0)$, $e^p(0)$, and $g_2(0)$. We seek to determine whether the same consumption is supported where the parent transfers some portion of $g_2(0)$ or $e^p(0)$ through g_1, expecting the child to save for herself or invest in her own education. Where $g_2(0) > 0$, the answer is clear. The child's choices of e^k and a^k meet condition (2) where $e^k + a^k > 0$. Whenever $g_2(0) > 0$, (1), (2), and $h'(e^p) = R$ together imply $u'(c_1^k) > \beta R u'(c_2^k)$. However, among conditions (8) is the requirement that $u'(c_1^k) = \beta R u'(c_2^k)$. Thus whenever $g_2(0) > 0$, the parent and the child disagree on the child's optimal intertemporal consumption path. Allowing the child to save independently or invest in her own education will lead to consumption other than $\{c_1^p(0), c_2^p(0), c_1^k(0), c_2^k(0)\}$. Thus the $e^k + a^k = 0$ equilibrium is the only set of actions that supports the parent's preferred $\{c_1^p, c_2^p, c_1^k, c_2^k\}$. The parent chooses $\{g_1, a^p, e^p, g_2\} = \{g_1(0), a^p(0), e^p(0), g_2(0)\}$ as in (8) in this unique equilibrium, imposing $e^k + a^k = 0$ and therefore $\dfrac{e^p}{e^p + e^k} = 1$.

Where $g_2(0) = 0$, however, the parent may reallocate transfers and still achieve $\{c_1^p(0), c_2^p(0), c_1^k(0), c_2^k(0)\}$. Only the reallocation of e^p to g_1 must be considered. Define $\underline{e}$ such that $u'(Ra^p) = \alpha u'(h(\underline{e}))$. Suppose that the parent increases g_1 to $g_1 = g_1(0) + \varepsilon$, where $\varepsilon \in \left(0, e^p(0) - \underline{e}\right]$, while maintaining $a^p = a^p(0)$ and $g_1 + e^p = g_1(0) + e^p(0)$. Since $e^p \geq \underline{e}$, the second period transfer is still zero. Further, the child's choice of $e^k = 0$ given $\left(g_1(0), a^p(0), e^p(0)\right)$ implies that she chooses an e^k at which $e^p + e^k \leq e^p(0)$ given $\left(g_1(0) + \varepsilon, a^p(0), e^p(0) - \varepsilon\right)$. Therefore, by conditions (9), $h'(e^p + e^k) > R$ and the child's condition (2) determining her choice of e^k reduces to

$$u'(c_1^k) = \beta h'(e^p + e^k) u'(c_2^k).$$

Since the above agrees with the intertemporal condition on the child's consumption in (9), we see that the parent's reallocation of $\varepsilon \in \left(0, e^p(0) - \underline{e}\right]$ from e^p to g_1 results in the same equilibrium $\{c_1^p(0), c_2^p(0), c_1^k(0), c_2^k(0)\}$. Finally, condition (2) and the definition of $\underline{e}$ together indicate that where *p* reallocates $\varepsilon \in \left(e^p(0) - \underline{e}, e^p(0)\right]$ from e^p to g_1 the child's educational investment may or may not be such that (17) holds. Therefore where $g_2(0) = 0$ there does exist a continuum of equilibria $\{g_1, a^p, e^p, a^k, e^k\} \in \left[\{g_1(0), a^p(0), e^p(0), 0, 0\}, \{g_1(0) + e^p(0) - \underline{e}, a^p(0), \underline{e}, 0, e^p(0) - \underline{e}\}\right]$ that support the unique equilibrium values of $\{c_1^p, c_2^p, c_1^k, c_2^k\}$, and there may exist further equilibria $\{g_1, a^p, e^p, a^k, e^k\} \in \left[\{g_1(0) + e^p(0) - \underline{e}, a^p(0), \underline{e}, 0, e^p(0) - \underline{e}\}, \{g_1(0) + e^p(0), a^p(0), 0, 0, e^p(0)\}\right]$ that support the unique equilibrium values of $\{c_1^p, c_2^p, c_1^k, c_2^k\}$. These values imply $\frac{e^p}{e^p + e^k} \in [0,1]$, completing the proof.

Table 1: Test of Efficiency (Parent-Child Income Pooling), 1993 PSID Data

Dependent variable: Annual food expenditure of child's household	**Parameter**	**Standard error**	**T-statistic**
Total (parent's and child's) household income	0.041	0.009	4.66
Total (parent's and child's) household income squared / 10^6	-0.069	0.024	-2.88
Parent's household income	-0.026	0.009	-2.93
Parent's household income squared / 10^6	0.059	0.025	2.35
Parent's househod head's age	5.493	7.270	0.76
Parent's household head is female	168.558	232.032	0.73
Parent's household head is working	-39.339	195.503	-0.2
Parent's net worth / 10^3	-0.049	0.140	-0.35
Parent's household head is a high school graduate	160.195	204.409	0.78
Parent's household head has some college education	18.283	243.643	0.08
Parent's household head is a college graduate	-68.123	381.392	-0.18
Parent's household head has post-college education	-311.034	362.431	-0.86
Parent is currently married	-106.267	207.713	-0.51
Number of persons in the parent's family unit	61.449	65.296	0.94
Number of split-offs out of the parent's family	-40.881	36.963	-1.11
Child's household head's age	-0.514	10.571	-0.05
Child's household head is female	-441.244	151.557	-2.91
Child's household head is working	311.647	241.376	1.29
Child's net worth / 10^3	0.611	0.908	0.67
Child's household head is a high school graduate	-193.999	229.957	-0.84
Child's household head has some college education	95.132	311.410	0.31
Child's household head is a college graduate	41.037	331.997	0.12
Child's household head has post-college education	299.693	471.687	0.64
Number of persons in the child's family unit	718.154	82.138	8.74
Intercept	1062.851	676.897	1.57
Number of observations		817	
Number of clusters (original families)		575	
R-squared		0.230	

Note: We conditioned the children sample on having never been married but moved out of their parent's home.

Table 2: Ordered Logit Estimates of the Fraction of Tuition Paid by Parents, HRS Sample

	Large Sample			Sample with Altruism Question		
Dep. Var.: Parent paid none (0), some (1), or all (2) of the college expenses	**Parameter**	**Standard error**	**T-statistic**	**Parameter**	**Standard error**	**T-statistic**
Intercept 2	2.632	0.439	6.00	3.661	0.963	3.80
Intercept 1	0.914	0.438	2.09	1.872	0.960	1.95
Parents age	0.056	0.007	7.54	0.072	0.017	4.28
Number of children	-0.176	0.012	-15.27	-0.219	0.028	-7.79
Black	0.021	0.065	0.32	0.086	0.167	0.52
Hispanic	-0.075	0.108	-0.69	0.225	0.355	0.63
Less than high school education	-0.342	0.070	-4.86	-0.107	0.183	-0.58
Some college	0.175	0.060	2.90	-0.006	0.130	-0.05
College graduate	0.421	0.077	5.44	0.183	0.166	1.10
Post-college education	0.442	0.078	5.65	0.311	0.161	1.92
Household income / 10^3	0.005	0.001	7.42	0.004	0.001	2.97
Household income squared / 10^9	-0.003	0.001	-4.31	-0.003	0.001	-2.02
Household net worth / 10^6	0.488	0.053	9.25	0.001	0.000	5.44
Child is a male	-0.177	0.045	-3.92	-0.368	0.101	-3.65
Child age	-0.039	0.005	-7.72	-0.039	0.012	-3.37
Child is a stepchild	-0.460	0.080	-5.74	-0.597	0.176	-3.39
If your child had only 3/4 of your income, would you give them 5% of yours?				0.325	0.107	3.04
Number of observations	7139			1467		
Log likelihood	-7213.09			-1463.67		

Table 3: OLS Regressions on the Percentage of Tuition Paid by Parents, HRS Sample

	Large Sample			Sample with Altruism Question		
Dependent variable: The percentage of tuition paid by parents	**Parameter**	**Standard error**	**T-statistic**	**Parameter**	**Standard error**	**T-statistic**
Intercept	11.426	15.196	0.75	49.937	32.409	1.54
Parent age	0.914	0.260	3.52	0.314	0.577	0.54
Number of children	-3.395	0.460	-7.39	-6.082	1.077	-5.64
Black	-9.563	2.615	-3.66	-7.720	6.505	-1.19
Hispanic	-1.088	4.697	-0.23	37.504	26.611	1.41
Less than high school education	-4.133	2.910	-1.42	-3.870	7.052	-0.55
Some college	3.168	2.237	1.42	-4.508	4.720	-0.95
College graduate	13.118	2.692	4.87	13.116	5.314	2.47
Post-college education	8.511	2.626	3.24	0.404	5.347	0.08
Household income / 10^3	0.134	0.018	7.64	0.221	0.051	4.35
Household income squared / 10^9	-0.076	0.015	-5.16	-0.392	0.092	-4.28
Household net worth / 10^6	2.729	0.598	4.56	1.319	0.665	1.98
Child is a male	-2.859	1.666	-1.72	-10.530	3.478	-3.03
Child age	-0.514	0.190	-2.70	-0.330	0.430	-0.77
Child is a stepchild	-3.398	2.809	-1.21	12.855	5.970	2.15
If your child had only 3/4 of your income, would you give them 5% of yours?				6.486	3.749	1.73
Number of observations	2166			464		
Adj R-squared	0.137			0.186		

Table 4: Correlates of Cash Transfers, Including a Family-Specific Effect, WLS Sample

Dependent variable: Amount of cash transfer receipt	Coefficient	Standard error	T-statistic
Age of child	225	632	0.36
Gender of child (male)	2,722	1,748	1.56
Oldest child	190	1,926	0.10
Youngest child	-1,599	2,570	-0.62
Adopted child	6,146	8,928	0.69
Marital status of child (currently married)	323	2,011	0.16
The child lives with parents	-5,608	4,076	-1.38
Amount of tied transfer receipt	-0.36	0.09	-4.10
Intercept	5,515	17,818	0.31
Fixed-effects (within) regression	Number of observations = 1724		
Group variable (i): HHID1	Number of groups = 1306		
R-sq: within = 0.0608	Observations per group: min = 1		
between = 0.0552	avg = 1.3		
overall = 0.0258	max = 4		

Note: We conditioned the sample on having a positive cash transfer receipt and at least some college education but not being in school.

Appendix Table 1: Sample Statistics for the Analysis Based on the 1993 Panel Study of Income Dynamics

Variable	Sample size	Mean	Standard deviation
Annual food expenditure for food used at home	817	2,241	1,885
Annual food expenditure for meals away from home	817	1,057	1,277
Value of food stamps in 1992	817	480	1,105
Total annual food expenditure of the child's household	817	3,778	2,443
Parent's household income	817	24,770	47,811
Child's household income	817	18,884	24,390
Total (parent's and child's) household income	817	43,654	57,523
Parent's househod head's age	817	55.6	14.5
Parent's household head is female	817	0.46	0.50
Parent's household head is working	817	0.53	0.50
Parent's net worth	817	193,795	669,305
Parent's household head is not a high school graduate	817	0.37	0.48
Parent's household head is a high school graduate	817	0.33	0.47
Parent's household head has some college education	817	0.14	0.35
Parent's household head is a college graduate	817	0.08	0.27
Parent's household head has post-college education	817	0.07	0.25
Parent is currently married	817	0.47	0.50
Number of persons in the parent's family unit	817	2.42	1.36
Number of split-offs out of the parent's family	817	2.52	1.91
Child's household head's age	817	30.6	7.8
Child's household head is female	817	0.50	0.50
Child's household head is working	817	0.73	0.45
Child's net worth	817	27,680	109,366
Child's household head is not a high school graduate	817	0.21	0.41
Child's household head is a high school graduate	817	0.39	0.49
Child's household head has some college education	817	0.21	0.41
Child's household head is a college graduate	817	0.13	0.33
Child's household head has post-college education	817	0.06	0.25
Number of persons in the child's family unit	817	1.98	1.38

Note: We conditioned the children sample on having never been married but moved out of their parent's home.
Parent's and child's information is collected from the 1993 head of the household.

Appendix Table 2: Sample Statistics for the Analysis Based on the Health and Retirement Study

Variable	Sample size	Mean	Standard deviation
Parent age	15,499	64.18	3.60
Number of children	15,499	4.81	2.56
Black	15,499	0.19	0.39
Less than high school education	15,499	0.32	0.47
High school graduate	15,499	0.35	0.48
Some college	15,499	0.18	0.39
College graduate	15,499	0.07	0.26
Post-college education	15,499	0.07	0.26
Household income	15,499	47.02	63.80
Household net worth	15,499	309.10	811.10
Child is a male	15,499	0.51	0.50
Child is a stepchild	15,499	0.13	0.34
Child age	15,499	38.73	5.17
Child less than high school education	15,499	0.14	0.35
Child is a high school graduate	15,499	0.39	0.49
Child has some college	15,499	0.22	0.41
Child is a college graduate	15,499	0.17	0.37
Child has a post-college education	15,499	0.08	0.27
Cash transfers post-college "G2"	5,285	1.93	8.20
Did child receive cash transfers?	5,285	0.29	0.45
Parent paid none (0), some (1), or all (2) of the college expenses of the child	7,329	1.01	0.80
Total fraction of educational expenses paid by parents	2,240	47.21	41.52
If your child had only 3/4 of your income, would you give them 5% of yours?	2,848	0.62	0.49
Cash transfers 93-94	9,497	387.24	2,099.71
Cash transfers 95-96	11,490	751.67	3,852.26
Cash transfers 97-98	11,583	672.15	3,888.57
Cash transfers 1999-2000	11,878	716.86	4,429.05
Did child receive cash transfers in 1999-2000?	11,878	0.15	0.35
Did your child attend an out-of-state public university?	2,272	0.09	0.29
Did your child attend a private university?	2,272	0.15	0.36

Note: We conditioned the children sample on being aged 30 or older.
Parent information is collected from the primary respondents if available, and their spouses or partners if not.

Appendix Table 3: Sample Statistics for the Analysis Based on the Wisconsin Longitudinal Study

Variable	Sample size	Mean	Standard deviation
Age of child	1,724	27.85	2.89
Gender of child (male)	1,724	0.52	0.50
Oldest child	1,724	0.43	0.50
Youngest child	1,724	0.22	0.42
Adopted child	1,724	0.03	0.18
Marital status of child (currently married)	1,724	0.60	0.49
The child lives with parents	1,724	0.06	0.24
Amount of tied transfer receipt	1,724	10,158	18,817
Amount of cash tranfer receipt	1,724	9,289	24,217

Note: We conditioned the sample on having a positive cash transfer receipt and at least some college education but not being in school. The amount of cash transfer receipt does not include any cash transfer amount received before receiving tied transfers.